PB85-214138

Superfund Record of Decision (EPA Region 9)
Stringfellow Acid Pits Site, Glen Avon
California (Initial Remedial Measure), July 1983

(U.S.) Environmental Protection Agency
Washington, DC

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EPA

Superfund Record of Decision:

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16. ABSTRACT

The Stringfellow site is located in Riverside County, approximately five miles northwest of the City of Riverside and one mile north of the community of Glen Avon. The Stringfellow site which encompassed approximately 17 acres, potentially affects the Chino III ground water basin which is used for industrial and agricultural purposes and as a domestic drinking water supply for approximately 40,000 residents.

During the site operation from 1956 to 1972, approximately 34 million gallons of toxic waste were disposed of at the site. Past disposal techniques included discharging liquid wastes, mainly acids and heavy metals, to ponds for solar evaporation and spraying liquid wastes into the air to accelerate evaporation. Substances disposed of include heavy metals such as chromium and cadmium, acids including sulfuric acid, and organics including DDT and TCE. The selected remedial alternative involves initial remedial measures to fence the site, and maintain the existing cap, and control erosion; interim source control for off-site disposal of leachate extracted above and below the on-site clay barrier dam, and reimbursement to the State for source control measures.

17. KEY WORDS AND DOCUMENT ANALYSIS

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RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SITE: Stringfellow Acid Pits, Glen Avon, Riverside County, California

ANALYSIS REVIEWED:

I have reviewed the following documents which analyze the site conditions and the cost-effectiveness of remedial alternatives at the Stringfellow Acid Pits:

Stringfellow Technical Audit Report
Black and Veatch Report
July 1983

Engineering Study of Stringfellow Class I Disposal Site - Hazardous Waste Management Seminar
James Montgomery Engineers (JMM)
August 1980

Report on Phase II Work for Closure of Stringfellow Class I Hazardous Waste Disposal Site - Hydrogeologic Evaluation
JMM
May 1981

An Evaluation of Ground Water Disposal Alternatives and Post-Closure Monitoring for Stringfellow Class I Hazardous Waste Disposal Site
JMM
October 1981

Staff Summaries and Recommendations

Five additional engineering studies which were completed by James M. Montgomery Consulting Engineers, Inc. prior to August 1980, and are related to the Stringfellow site.

COMPONENTS OF SELECTED OPTION

- Initial Remedial Measures
  - Fencing
  - Erosion Control
- Interim Source Control
  - Continued hauling and disposal
  - Storage tanks
  - O & M Plan
  - Ongoing Site Maintenance
- Interim Offsite Measure
  - Contaminated ground water mitigation

- Source Control (reimbursement for partial measures)
  Neutralization of acidic solids
  Removal and offsite disposal of DDT contaminated material
  Clay Cap
  Barrier dam
  Gel-injection wall into bedrock
  System of monitoring, interceptor and extraction wells
  Run-off abatement system

DECLARATIONS

Based on my review of the above documents, I have determined that the source control remedial actions performed at the Stringfellow site were selected following analyses consistent with those analyses outlined in sections 300.68(f)-(i) of the National Oil and Hazardous Substances Contingency Plan (NCP) and comprised a cost-effective remedy that currently is providing protection of public health, welfare, and the environment. I have also determined that the proposed interim source control and interim offsite remedial actions are cost-effective and necessary to maintain and safeguard the existing source control remedial actions. These interim actions are necessary to protect the public health and environment during the time required to conduct the long-term remedial investigation and feasibility study that will identify additional cost-effective remedial actions that may be required to effectively mitigate and minimize damage to and provide adequate protection of public health, welfare and the environment consistent with section 300.68(j) of the NCP. I have determined that the proposed initial remedial measures are consistent with section 300.68(e)(1) of the NCP, being cost-effective and necessary to limit the threat of exposure to a significant health hazard.

Consistent with section 101(24) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, I have determined that the offsite disposal of the material contaminated with DDT was more cost-effective than the other remedial options for dealing with the material. The continued interim offsite disposal of contaminated leachate is the only feasible method, prior to implementation of future remedial actions, to protect the public health, welfare and the environment from a present or potential risk.

I have taken into account the public comments regarding the selection of the remedial actions approved in this Record of Decision. While many public comments supported offsite transport and disposal of all contaminated materials, I have determined that the information on this site and related analyses that presently exist would not support a decision under section 101(24) authorizing offsite transport and disposal of all contaminated material at this time. The remedial investigation and feasibility

study to be conducted by the State will analyze the need for additional source control measures and measures to mitigate the offsite contaminated ground water plume, and compare that with other remedial measures, including offsite transport and disposal of all contaminated material. Because the final remedial measure has not been selected for this site, and additional remedial measures may be necessary, I will ensure that adequate opportunities are provided for public comments and consideration of those comments in the selection of any additional remedial actions. To that end, I am requiring that a community relations plan be integrated with the remedial investigation/ feasibility study.

Lee M. Thomas
Assistant Administrator
Office of Solid Waste and Emergency Response

7/22/83
Date

STRINGFELLOW SITE

Briefing Materials for Record of Decision

I. BACKGROUND

A. Site Description

The Stringfellow site is located in Riverside County, approximately five miles northwest of the City of Riverside and one mile north of the Community of Glen Avon. The site is situated in a canyon on the southern slopes of the Jurupa Mountains. It lies in the natural drainage path of approximately 270 acres of the canyon watershed at the head of Pyrite Creek. The Stringfellow site potentially affects the Chino III Ground Water Basin, a domestic drinking water supply for approximately 40,000 potentially affected residents. The ground water supply is also used for industrial and agricultural purposes.

B. Site History

During the site operation from 1956 to 1972, approximately 34 million gallons of toxic waste were disposed of at the site. Past disposal techniques included discharging liquid wastes, mainly acids and heavy metals, to ponds for solar evaporation and spraying liquid wastes into the air to accelerate evaporation. During operation, the site consisted of 3.5 acres of evaporation ponds and 5.6 acres of land contaminated by aeration operations. The total land area is approximately 22 acres. Substances disposed of include heavy metals such as chromium and cadmium, acids including sulfuric acid and organics, including DDT and TCE.

In 1956, Stringfellow Quarry Company, Inc., opened a hazardous waste disposal site pursuant to a land use variance issued by the Riverside County Planning Commission.

From 1957 through 1968, the site operated as a Class I hazardous waste disposal site.

In 1969, during a heavy rainstorm period, an uncontrolled release of chemically contaminated water occurred. This material discharged down Pyrite Creek and through the Community of Glen Avon, located approximately one mile downstream. After this incident, the local community began to seek the closure of the site. In November 1972, the site was voluntarily closed by the

Stringfellow Quarry Company, Inc. In 1974, the Riverside County Planning Commission revoked the site's land use variance, and in 1975, the Regional Water Quality Control Board (RWQCB) was notified by the corporation that it was financially unable to continue maintenance of the site. Stringfellow Quarry Company, Inc. failed to pay property taxes after fiscal year 1973-1974.

In 1975, the RWQCB declared the site a public nuisance as a nonoperating industry. This action allowed the RWQCB to begin its study of the site and to place liens on the property for costs incurred for site closure actions.

The RWQCB's consultant, James M. Montgomery Engineers, Inc, (JMM), produced a report in 1977, recommending the encapsulation of material onsite by: 1) injecting gel into fissures in the underlying bedrock; 2) installing monitoring and interceptor wells to locate and extract the downstream contaminated plume; and 3) installing a clay cap over the site.

In 1978, the State legislature appropriated funds for abatement activities at the Stringfellow site. Before these activities could be initiated, heavy rainfall in the spring of 1978, once again caused the site to overflow into Pryite Creek and downstream through Glen Avon. In order to prevent a catastrophic release from the site, approximately 800,000 gallons of chemically contaminated water was discharged to the Creek under the supervision of the RWQCB.

Between 1978 and 1981, the RWQCB contracted for the removal of approximately 6.5 million gallons of liquid wastes and the DDT-contaminated material from the site. These wastes were hauled to Class I hazardous waste disposal sites in southern California.

In March, August, and September 1980, the Federal Regional Response Team (RRT), with the assistance of the U.S. Coast Guard Pacific Strike Team, was requested by the RWQCB to assist in preventing a third surface discharge. This response effort resulted in the removal of over ten million gallons of chemically contaminated water, reinforcement of the containment barriers, and improvement of the truck loading area.

In 1980, the property was acquired by the State and Riverside County by tax deed. In 1981, the State purchased the County's interest in the property in order to facilitate the site's cleanup. Restrictions on the future use of the property have been recorded in the title to prevent future disturbances of the site.

Following a public hearing on July 2, 1980, during which six alternatives for abating the problems at the site were discussed, RWQCB adopted Resolution No. 80-142, which called for implementing the alternative of complete removal of all liquid and solid wastes from the site.

In December 1980, because it was apparent that funding for the total removal alternative would not be granted, RWQCB adopted Resolution No. 80-219, which stated that an interim abatement program should be implemented to provide protection from leaching or washout of the waste material. In addition to protecting residents downstream and the environment, this interim program would facilitate the total removal of material once financing became availalbe.

The RWQCB was awarded a grant from the State Water Resources Control Board (SWRCB) to accomplish an interim abatement program for onsite containment of wastes. In 1981, geological and hydrological investigations were conducted. In May 1981, RCRA funds were provided by EPA to the RWQCB for design and construction engineering activities for the interim abatement program.

The interim abatement program was designed to contain the wastes onsite and minimize the risk of further contaminant migration until funding for total removal was available. The program was aimed at reducing the amount of contained waste, neutralizing the pH of the remaining waste, eliminating surface flow contamination by capping, reducing and treating the existing ground water contamination. A detailed summary of the interim abatement program is presented in Appendix 1B.

The State's expressed interest in participating in the Superfund program resulted in Governor Brown designating Stringfellow as the State's top priority site in November 1981. In order to continue the activities at the site and to qualify for CERCLA funds, the State requested a deviation from EPA's grant regulations in July 1981. Additionally, the State realized that all actions taken would need to be consistent with CERCLA and the draft NCP. Therefore, offsite disposal of hazardous wastes would have to be evaluated and determined to be more cost-effective than other remedial actions.

In April and June 1982 the State recommended to EPA that the onsite containment program, with additional measures to enhance it's effectiveness, was the cost-effective remedy.

On July 2, 1982, the California Department of Health Services (DOHS) submitted an application for a cooperative agreement to EPA. The DOHS requested reimbursement of $3.6 million for the RWQCB's interim program. In addition, DOHS requested $2.6 million to augment the RWQCB's interim program by designing and installing additional monitoring and interceptor wells and by conducting feasibility studies for upgradient ground water diversion, onsite containment of contaminants and downgradient plume abatement.

In August, while the application for the July cooperative agreement was being processed, EPA completed an intensive investigation which yielded good evidence linking responsible parties to the Stringfellow site. Based in part on this evidence and an issue concerning the State's cost share, EPA suspended processing the July application.

In August and October 1982, EPA issued over 200 combination CERCLA section 104/Notice Letters to responsible parties. The government negotiating team which consisted of EPA, the State, and Department of Justice (DOJ) held a general meeting with responsible parties in November 1982. The purpose of this meeting was to initiate enforcement discussions with responsible parties to recover past and future costs of cleanup.

The government team met with the responsible party steering committee on four subsequent occasions to discuss settlement. An acceptable settlement was not offered by responsible parties. On April 21, 1983, DOJ and the State of California filed a civil suit in the United States District Court for the Central District of California. Eighteen generators, 4 transporters, and 9 owner/operators were named as defendants in the lawsuit. The complaint seeks to obtain funds from the defendants to abate the hazards at the site and to reimburse the government for all funds expended by it.

On April 22, 1983, a Congressional hearing was held in the Community of Glen Avon. At that hearing the Director of the Office of Emergency and Remedial Response (OERR) discussed the projects to be completed under the proposed cooperative agreement.

On May 4, 1983, the Director of OERR signed the Action Memorandum authorizing remedial planning work at the site.

On June 15, 1983, a final cooperative agreement was received in EPA Headquarters from the State of California.

C. Recent Immediate Removal Actions

On or about May 16, 1983, liquid was discovered seeping into the surface several hundred yards below the Stringfellow Acid Pits barrier dam. The flow mixed with an ongoing stream of water which is channelled around the site, and eventually leaves the site via Pyrite Creek. Because of heavy inflow to the site in recent months, the liquid level behind the barrier dam remains high. Because of the hydraulic head behind the dam liquid which manages to escape the barrier raises the water level significantly below the dam, forcing it to the surface.

An initial emergency measure taken by the California Department of Health included digging a pit approximately 10 x 20 feet, four feet deep, from which the liquid could be removed several times daily with a vacuum truck. The direct contact threat has been alleviated by the installation of a french drain in the seepage area, with a sump to collect liquids and an automatic pump to return liquids to the holding tanks. Grading and rechannelling have been completed to divert uncontaminated water around the area of seepage.

Security of the site has been enhanced by installation of a partial fence along the road leading to the site gate, and repair of an existing fence across the creek which runs through the site.

II. SUMMARY OF REMEDIAL ACTIONS

The State has submitted a cooperative agreement to fund several remedial response activities. This section describes both the existing and proposed actions for which funding is being requested. Additional remedial planning activities (RI/FS), which are also a part of the cooperative agreement, are discussed in Section III.

A. Source Control Measures

During the period from 1975 to 1980 the State authorized a series of engineering investigations and studies to evaluate alternatives for abatement of the risks posed by the Stringfellow site. The conclusion and recommendations of that process are summarized here. A series of reports resulted in the consideration of 6 alternatives in the December 1979 report prepared by James M. Montgomery Engineers (JMM). These alternatives are summarized below; however, a detailed description of the earlier engineering effort and the remedial actions actually constructed is presented in Appendix 1. The alternatives were:

Alternative Description	Cost Estimate[1/]
1. Remove liquids (offsite disposal), level ponds and grade site, install clay cap, drainage and leachate collection.	$810,000
2. Same as No. 1 with kiln dust neutralization of soils	$990,000
3. Neutralization of liquids and solids onsite, level ponds and grade site, clay cap, drainage and leachate collection	$910,000
4. Same as No. 3 with bottom sealing of site	$1,240,000
5. Chemical fixation of liquids and solids, level ponds and grade site, clay cap, drainage and leachate collection	$1,780,000 to $2,850,000
6. Removal of liquids and solids, (offsite disposal) level ponds and grade, clay cap	$11,600,000

1/ 1979 cost estimates

The alternatives were evaluated for cost and technical feasibility. The effectiveness of each alternative in controlling the release of wastes into the environment was also evaluated. Alternative No 3., onsite neutralization and containment of solid and liquid wastes, appeared to be the most cost-effective; however, alternatives 3, 5 and 6 were evaluated in more detail to improve the cost estimates and account for worsening site conditions. The revised cost estimates for the remaining alternatives were:

Alternatives	Cost Estimate[2]/
No. 3	$2,496,000
No. 5	$4,036,000
No. 6	$21,000,000 to $41,000,000[3]/

A public hearing was held on July 2, 1980, to discuss the various alternatives considered. Comments from the local community strongly favored the removal and disposal of liquids and solids (alternative No. 6). The RWQCB passed a resolution supporting the removal alternative (No. 6) and requesting funding from the SWRCB. However, due to the high cost of removing and disposing of liquids and solids, the RWQCB subsequently approved construction of the onsite neutralization and containment alternative (No. 3) as an interim measure until funding for removal could be obtained.

On April 9, 1982, the RWQCB reevaluated the proposed site remedies in light of the proposed NCP and CERCLA cost-effective requirements and recommended alternative No. 3 to the State DOHS.

In June 1982, the State recommended to EPA that onsite containment, without future removal of solids was the cost-effective remedy. This recommendation was based on the following factors:

1. Onsite containment was the least cost alternative to adequately abate the public nuisance and the threat of discharge of toxic materials. The measure should also present no adverse environmental impacts.

2. Adverse impacts created prior to the remedial action would be mitigated by closure and maintenance of the site (e.g. operation of downstream extraction wells).

3. Additional measures to maximize the reliability of containment should be evaluated.

2/ 1980 cost estimates
3/ Cost range was based on actual quotations from disposal facilities

The State's decision took the community's desires into account concerning their preference for the total removal option. The analysis of the alternatives indicated that the most cost-effective solution to control the source of hazardous waste was onsite containment. However, the State's review of the onsite containment project indicated that additional measures may be needed. Therefore, in response to these concerns, the State proposed a long-term remedial investigation and feasibility study to effectively mitigate and minimize damage to and provide adequate protection to public health, welfare or the environment. This evaluation will include additional source control measures, including offsite transport and disposal of all contaminated material, and measures to mitigate the offsite contaminated ground water plume.

To that end, a Community Relations Plan will be implemented by August 22, 1983, prior to initiation of field activities. The plan will require that community relations activities be integrated with the remedial investigation and feasibility study activities. Adquate opportunity for public comments concerning these activities will be provided for and comments will be analyzed and integrated into the selection of any additional remedial measures.

B. Offsite Disposal Components of the Containment Alternative

1. Liquid Waste Removal.

Onsite neutralization of liquid wastes contained in the onsite ponds was part of the recommended containment alternative. However, before the State could implement this action, EPA's Regional Response Team and the Coast Guard removed over 10 million gallons of liquid waste on an emergency basis. This eliminated the need for liquid neutralization as a part of the remedial action.

2. DDT Removal

A part to the onsite containment alternative involved the selective removal and offsite disposal of DDT contaminated material. Since the material was confined to the northern portion of the site and due to its highly toxic nature, this material was disposed of separately from other contaminants. The State evaluated both onsite fixation and offsite disposal as feasible alternatives. Proposals were requested for both alternatives. Evaluation of the proposals indicated that complete removal was the most cost-effective approach.

This decision was based on the following cost proposals:

Alternative	Cost Quotation
Onsite fixation	$398/CY to $632/CY
Offsite disposal	$139/CY

3. Leachate Collection and Disposal

The onsite containment alternative included facilities for collection and extraction of leachate, including extraction wells and a gravel collection system. Operation of the two extraction wells located upstream of the clay barrier in the gravel collection system is required to maintain the integrity of the clay barrier and to help prevent leachate seepage from the site (Note: The clay barrier and gravel collection system were added to the alternative since actual site conditions did not prevent lateral migration of leachate as was previously thought). The extraction well located in the northern portion of the site collects contaminated water from seeps, springs, and bedrock fractures in the area. Well IW-1 is pumped because it is located in an area of high contaminant concentration, and removal of contaminated water from this well will reduce the downstream migration of contaminants. The pumping of these four wells and hauling the waste offsite to an approved disposal facility is the only presently available method of disposal. The most cost-effective alternative for long-term disposal will be determined in the Feasibility Study.

III. PROPOSED REMEDIAL PLANNING ACTIVITIES

A. Cooperative Agreement

The State has submitted a cooperative agreement to fund several remedial response activities, including past and proposed remedial actions, and funding for remedial planning. The general objective of the remedial investigation/feasibility study (RI/FS) is to develop a cost-effective remedial action for final site closure at the Stringfellow facility consistent with State and Federal policies and guidelines to protect public health, welfare, and the environment. The contractor will review background information, collect and analyze additional data, establish evaluation criteria, identify and select the cost-effective alternative, and develop predesign criteria.

The remedial investigation/feasibility study includes three major areas of the site: upgradient, onsite, and downgradient. The objectives of these specific areas are as follows:

UPGRADIENT: Identify and evaluate methods to prevent or manage upstream ground water and surface water entering the site.

ONSITE: Identify and evaluate methods to prevent the migration of existing hazardous substances offsite.

DOWNGRADIENT: Identify and evaluate aquifer characteristics, the extent of the existing plume, and methods of controlling pollutant migration in the ground water downgradient of the site.

B. Federal Lead Fast-Track Remedial Investigation/Feasibility Study

The State requested that an EPA-lead fast-track remedial investigation/feasibility study be conducted to identify and evaluate alternative methods of controlling the migration of contaminated ground water in the downgradient area. This project is expected to require two to three months and will result in a recommended technology for treatment of contaminated ground water in accordance with the approved interim off-site measures.

C. EPA Technical Review of Past Remedial Actions

The firm of Black and Veatch was hired to conduct a review of past site activities and conduct a technical audit of work performed since the passage of CERCLA.

The review criteria used by Black and Veatch included:

1) Consistency with the NCP,

2) Implementation of work in a logical and orderly manner, resulting in a reasonable site response approach, and

3) Conformity with standard engineering and construction practices in effect at that time.

The past source control actions (May 1981 to date of award of the cooperative agreement) were found to be consistent with the three review criteria. Expenditures for these actions were claimed by the State for reimbursement under a deviation from the Federal grant regulations (40 CFR 30). Based on the outcome of this review by Black and Veatch and a fiscal audit by the EPA Inspector General, EPA has concluded that the State will be reimbursed for the majority of the claimed expenditures in the award of funding for the cooperative agreement.

D. Proposed Interim Remedial Activities.

The State has requested funding for several new activities. These include:

1) Initial Remedial Measures.

2) Interim Source Control Measures.

3) Interim Off-site Measures.

These interim measures are supplemental components of existing work done at the site, and as such are not new remedial actions. Each activity is discussed below.

1. Initial Remedial Measures

This Record of Decision approves fencing of the entire site to limit the threat of direct contact and erosion control measures to mitigate damage caused by severe weather conditions to the site. These measures are appropriate and consistent with the National Contingency Plan (40 CFR 300.68 (e)(1)(i) and (ii)).

Fencing will deter unauthorized access to the site and limit the potential for direct contact with hazardous substances. This action will also provide security for materials and equipment stored at the site during site investigations and remedial actions. Fencing is also considered cost-effective when compared on a life cycle basis to other security measures such as a 24-hour a day security guard.

Erosion control has been proposed as an appropriate IRM in accordance with Section 300.68(e)(1)(ii) of the NCP. Placement of a clay cap with a one foot native soil cover was part of the previous onsite containment action. However, the native soil layer was not seeded to help prevent erosion and the heavy rains during the winter and spring of 1982-1983 caused erosion problems at the site. Erosion control measures are considered necessary to prevent erosion through the native soil and clay layers with the possible washout of contaminated material, and to maintain the integrity of the perimeter drainage ditches. There are no other feasible alternatives for the IRM because the proposed activities supplement and are required to maintain the effectiveness of the drainage controls installed during the previous remedial action.

2. Interim Source Control

This Record of Decision approves the hauling and off-site disposal of leachate extracted above and below the clay barrier dam onsite. This measure is necessary to maintain the effectiveness of the clay barrier dam and no other effective interim alternatives currently exist. This measure will be funded during the time required for the State to complete the long-term remedial investigation/feasibility study (currently estimated to take 18 months). The long-term RI/FS will evaluate alternatives to reduce leachate generation onsite.

The above activities are consistent with source control measures as defined in NCP section 300.68(e)(2) because they are necessary to prevent or minimize the migration of hazardous substances from the site. These activities are considered interim because they are necessary to supplement the existing remedial measures until the remedial investigation/feasibilty study can be completed and any additional remedial actions recommended by the study can be implemented.

These interim measures have been found to be cost-effective on the basis that no other feasible alternatives are available. These interim measure are not distinct remedial actions but are components needed to maintain and enhance existing site controls.

This Record of Decision also certifies that continued interim offsite disposal is necessary to protect public health and the environment in conformance with CERCLA section 101(24).

3. Interim Offsite Measures

This Record of Decision approves interim offsite measures to mitigate offsite contaminated ground water migration. In accordance with the NCP, offsite measures can be implemented to mitigate the effects on public health, welfare, or the environment when contamination has migrated beyond the area where hazardous substances were originally located. This situation exists at the site since a plume of contaminated ground water is migrating from the site toward areas where ground water is used for potable water supplies

In the application for the cooperative agreement the State requested funding for pumping of ground water from offsite wells IW-2 and IW-3, to mitigate this problem. EPA has denied funding of this task for the following reasons. A study recently completed, evaluating the effects of pumping IW-2 and IW-3 on the existing contaminant plume, concluded that operating these wells would not significantly effect the movement of the plume because the leading edge of the plume was past the influence of the wells. Therefore, it is not recommended that these wells be pumped until further evaluation has been completed.

EPA has approved approximately $2 million for interim offsite measures on the condition that the fast-track RI/FS is completed and recommends such measures. The fast-track RI/FS will determine the locations of new interceptor wells and technology required to dispose of contaminated water pumped from the wells.

IV. FUTURE ACTIVITIES

The remedial investigation/feasibility study conducted by DOHS will be completed in approximately 18 months. The RI/FS will evaluate and recommend remedial actions to address three areas on the site: 1-upgradient; 2-onsite; and 3-downgradient (these were discussed in section III.A). If additional remedial actions are required to improve reliability of the existing measures, a Record of Decision will be prepared for EPA approval. The cooperative agreement may then be amended to fund the implementation of any approved remedial actions.

STRINGFELLOW RECORD OF DECISION
APPENDIX 1

HISTORY OF ENGINEERING EVALUATION FOR PAST REMEDIAL ACTIONS

A. Engineering Evaluation

In late 1975, the RWQCB requested funds from the State Water Resources Control Board to investigate abatement alternatives. James M. Montgomery Consulting Engineers, Inc. (JMM) was selected to study and recommend abatement alternatives. Alternatives for opening the site were also required by the State Board to assess the comparative costs.

The primary purposes of the initial JMM report, submitted in 1977, were to develop and evaluate alternatives for either reopening or permanently closing the site and to provide future operating procedures and monitoring requirements. The report also presented a history of site operations, operational criteria, and administrative actions; a description of the site physical characteristics and the basic geologic and hydrologic setting of the Region and the site; and, a summary of ground water quality monitoring for the area downstream of the site.

The review of the ground water quality data revealed degradation of ground water quality downstream of the site which led JMM to question the previous assumption that the bedrock under the site was impermeable and concrete barrier prevented contaminant migration from the site. Three measures were incorporated in each of the alternatives for reopening or permanently closing the site to provide protection of downstream ground water users from contaminant migration:

- Construction of a bedrock sump downstream of the concrete barrier to collect leachate seeping under the barrier.
- Pressure grouting the bedrock both under the concrete barrier and at both ends of the barrier.
- Installation of interceptor wells downstream of the concrete barrier to intercept the contaminant plume.

The alternatives evaluated for site closure are summarized below. The actions described in Alternative A (Minimal Improvements) are incorporated into all of the subsequent alternatives for site closure.

- Alternative A, Minimal Improvements: Consists of the three measures discussed above plus removal of contaminated soil downstream of the existing sump, replacement of the northeast corner of the peripheral

site berm with a clay berm, disposal of water extracted from the interceptor wells, and installation of monitoring wells. (Estimated cost -- $190,000).

- Alternative B, Level Ponds and Cover Site: Consists of Minimal Improvements, removal of contaminated liquid, leveling of berms within the site, and placement of a surface cap. (Estimated cost (B1) -- $370,000).

- Alternative C, Fill to Grade and Cover Site: Consists of Minimal Improvements, removal of contaminated liquid, placement of fill to level the peripheral berms, and placement of a surface cap. (Estimated cost (C1) -$1,010,000).

- Alternative D, Encapsulate Material: Consists of Minimal Improvements, removal of contaminated liquid, encapsulation of contaminated soils and sludges, and placement of surface cover. (Estimated cost (D1) -$850,000).

- Alternative E, Remove Contaminated Material: Consists of Minimal Improvements, removal of contaminated liquid, removal of contaminated soil, and placement of a cover over or preparation of bedrock surface. (Estimated cost (E1) -- $3,700,000).

The evaluation process weighed the advantages and disadvantages along with the cost-effectiveness of each alternative. The recommended alternative for site closure was Alternative B, Level Ponds and Cover Site.

The California Department of Health Services (DOHS), March 1979 report suggested, among other recommendations that pH of the site material be raised to prevent possible deterioration of the clay cap. In the JMM December 1979 report the recommendations by DOHS to alter the waste pH were addressed.

The primary purpose of the December 1979 report was to reevaluate alternatives for site closure, developed previously in the January 1977 JMM Report. However, a number of site conditions had changed or were discovered in the intervening period which changed or allowed refinement of the assumptions used in the previous study.

The report compared the existing site conditions and available data with those reported in the earlier study. Based on this new information, JMM developed a program of interim remedial activities, evaluated the technical

and economic feasibility of chemical fixation and neutralization of contaminated liquid and solid wastes, and performed a feasibility analysis of six closure alternatives.

Changes in site conditions required reevaluation of previous recommendations as noted below:

- The volume of liquid contained onsite had increased from 300,000 gallons in 1977 to more than 3 million gallons in 1979, as a result of heavy rainfalls during this period. The increased liquid volume significantly increased the cost of the alternatives in the 1977 report which included hauling the offsite disposal.

- The previous assumption of minimal subsurface inflow to the site through the bedrock was based on the observations of concentrated vegetation in the upper portion of the site during the dry period. The observance of actual seeps and springs in these areas during a wet period implied a more fractured bedrock and a more substantial subsurface inflow than had previously been considered.

- Ground water monitoring data accumulated in the period between the 1977 and 1979 reports indicated seepage from the site was affecting downstream water quality. This suggested a more serious problem than was previously anticipated.

Remedial measures had been recommended in the previous report (JMM, January 1977). Additional measures and modifications to previous remedial measures recommended as a result of the new information are noted below:

- Reinforcement of the berms to provide additional containment volume was recommended to prevent future surface discharge of contaminated liquid.

- An extension of the gel injection program proposed in JMM's 1977 report was recommended to provide a wider and deeper seepage barrier.

- Additional monitoring wells were recommended to further define the extent of the pollutant plume. A planned program of water sampling was also recommended.

Six (6) new alternatives were developed for closure of the site. The alternatives incorporated the chemical fixation and neutralization data also developed in the report.

- Alternative 1 -- Remove contaminated liquid, grade and cover site with clay seal. (Estimated cost -- $810,000)

- Alternative 2 -- Remove contaminated liquid, neutralize solids, and cover site with clay seal. (Estimated cost -- $990,000)

- Alternative 3 -- Neutralize liquid, grade and cover site. (Estimated cost -- $910,000)

- Alternative 4 -- Neutralize liquid, grade site, encapsulate in kiln dust and cover with clay layer. (Estimated cost -- $1,240,000)

- Alternative 5 -- Chemical fixation, grade site and cover site with clay layer. (Estimated cost -- $1,780,000 to $2,850,000)

- Alternative 6 -- Remove contaminated material. (Estimated cost -- $11,600,000)

The alternative selected (Number 3) was basically alternative B-1 in the J.' January 1977 report, with modifications for providing drainage for surface water, interception of water from the springs at the northern end of the site, neutralizing liquid at the site with kiln dust, and installing a kiln dust cover layer to provide additional neutralization if any water should infiltrate from the surface through the clay cap. The modifications suggested in this report were basically refinements to the original proposal and were based on new information and environmental changes, such as the DOHS (1979) report and the increase in the volume of contaminated ground water at the site after two very wet winters.

As Phase I work got underway new unexpected problems were discovered and the closure plans had to be revised again. The major problem, discovered since the JMM December 1979 report was that, during excavation to prepare for the gel injection in the assumed rock fractures underneath the existing concrete dam, it was discovered that the dam was not keyed into bedrock at the ends, but was in fact built over alluvial material which allowed considerable seepage of waste out of the site.

The April 1980 JMM report updated the December 1979 draft report to analyze the subsurface conditions discovered during the Phase I construction activities. the report also refined two of the alternatives identified in the previous report.

The large amount of seepage and high degree of bedrock fractures discovered during the excavation of the concrete barrier raised serious questions about the integrity of the underlying bedrock. The recommendations in the report include additional geologic studies and interceptor well construction to confirm the extent and mitigate effect of seepage through the fractured bedrock.

Two of the six (6) alternatives developed in the previous report (JMM December 1979) were developed in more detail.

- Alternative 2 -- Neutralization (Revised estimated cost -- $2,496,000)

- Alternative 5 -- Chemical Fixation (Revised estimated cost -- $4,036,000)

The report concluded that the neutralization alternative offered the "best practicable technology" while the chemical fixation alternative was the "best available technology". Neutralization was determined to be the cost-effective solution.

Following a public hearing on July 2, 1980 during which the six alternatives for abating the problems at the site were discussed, RWQCB adopted Resolution No. 80-142, which called for implementing the alternative of complete removal of all liquid and solid wastes from the site. In a report to RWQCB dated December 1980, JMM examined this alternative in greater detail and evaluated the various locations which would accept the Stringfellow site wastes. The estimated cost for total removal was between $21 and $41 million depending on the site selected for disposal.

In December 1980, because it was apparent that funding for the total removal alternative would not be granted, RWQCB adopted Resolution No. 80-219, which stated that an interim abatement program should be implemented to provide protection from leaching or washout of the waste material. In addition to protecting residents downstream and the environment, this interim program would facilitate the total removal of material once financing became available.

B. Interim Abatement Program

The RWQCB was awarded a grant from the SWRCB of $4 million to accomplish the Interim Abatement Program. In 1981, initial geologic and hydrologic investigations were conducted during the predesign phase. In May 1981, a $95,000 Resource Conservation and Recovery

Act (RCRA) grant was awarded to the RWQCB for design and construction management activities.

The program was designed to contain the wastes onsite and minimize the risk of further contaminant migration. The program was aimed at reducing the amount of contained waste, neutralizing the remaining waste, reducing surface flow contamination, and containing, reducing and treating ground water contamination. The program consisted of all elements for onsite containment originally proposed by Montgomery Engineers with one major addition. The installation of a gravel collection system and clay core barrier dam on the downstream boundary on the disposal site was recommended to minimize lateral contaminant migration.

Elements of the program included:

1) pH neutralization of about 75 percent of waste material;

2) installation of concrete gutters and gunite channels for surface runoff abatement;

3) grading the site for proper drainage control;

4) installation of a one-foot kiln dust layer under a two-foot clay cap;

5) installation of 14 monitoring wells, 3 extraction wells upstream of the barrier dam, one extraction well downstream of the barrier dam, and 3 interceptor wells.

6) gel injection of the bedrock below the barrier dam consisting of one curtain in moderate to low fracture zones and two curtains in high fracture zones;

7) construction of a gravel collection system and a clay core barrier dam downstream of the disposal site;

8) construction of a pretreatment plant to treat extracted and intercepted flow; and

9) construction of a one-mile pipeline to hook up with the Santa Ana Regional Interceptor (SARI) for ultimate discharge through a seven-mile outfall into the Pacific Ocean

The RWQCB completed all elements of the Interim Abatement Program except for the design and construction of the pretreatment plant and the pipeline. Leachate is currently being pumped from the extraction wells and from the first downstream interceptor well for hauling and disposal at a Class I facility.

C. Augmentation

In June 1982, DOHS stated in a letter to EPA, Region IX, that onsite containment is the most cost-effective solution for final site mitigation with the completion of an additional augmentation program. The augmentation program was designed to maximize the reliability of each element of the onsite containment measures. Additional wells were to improve the ability to monitor and manage the contaminated plume. A feasibility study was to examine the cost-effectiveness of intercepting and diverting ground water around the site and upgrading the barrier dam and gel injection elements. A second feasibility study was to examine the characteristics of the offsite plume. These activities will be included in the RI/FS proposed under the cooperative agreement.

STRINGFELLOW RECORD OF DECISION
APPENDIX 2

COMMUNITY RELATIONS CHRONOLOGY

A. 1956-1979

Public concern with the Stringfellow site began almost immediately after the site was opened in 1956. The Parents of Jurupa, led by Ruth Kirby, have telephoned and written many letters to local, State, and Federal officials asking that something be done about the site. Over the years they have held a large number of public and group meetings concerning the disposal area. Many people believe the Parents of Jurupa were responsible for the site's closure in 1972. The group was incorporated in 1973, and presently has a core membership of about twenty people.

May 1972

A sample from the water supply well for the Glen Avon School contained a small amount of hexavalent chromium. The community was alarmed by this finding. Regional board officials later attributed the contamination to surface flooding. The Glen Avon well was subsequently closed.

November 1972

The Stringfellow site is closed.

July 1973

The Parents of Jurupa filed a petition with the State Board stating that the actions of the RWQCB were improper and inappropriate. The community group wanted the site closed permanently.

March 1974

The Riverside County Board of Supervisors declared the site a public nuisance, and ended all attempts to reopen the area for dumping. The Parents of Jurupa considered this a victory for the group.

March 1978

Representative George Brown held the first public meeting in the Glen Avon community. Formerly, all hearings were in downtown Riverside. A number of State and Regional water and air officials spoke

about the Stringfellow site problem on September 9, 1978, five months after the flooding of the wastewater. Residents of the surrounding communities, notably Parents of Jurupa members, also voiced their concerns.

1979

A second community group was formed. The group is called the Concerned Neighbors in Action (CNA). The group was formed with the assistance of the California Campaign for Economic Democracy. A number of other community organizations were instrumental in organizing CNA. They include:

- Jurupa Junior Women's Club;
- Glen Avon Babysitting Cooperative;
- Glen Avon Crime Watch;
- Pedley Women's Club;
- Glen Avon PTA; and
- West Riverside County Businessmen's Association

Like Parents of Jurupa, CNA favors complete removal of the site. The group has a core membership of about fifteen citizens and is actively interested in the site. Penny Newman is the leader of the organization.

B. 1980 - Present

March 1980

CNA held a meeting in the community center and showed the film "The Killing Ground" which focused on hazardous wastes.

May 28, 1980

Nine representatives of the community attended a State Water Resources Control Board hearing in Sacramento. They asked for funding for total removal.

July 2, 1980

RWQCB held a hearing to review alternatives for abatement of the problems at the Stringfellow site. A list of six alternatives was prepared by James M. Montgomery, Consulting Engineers. Staff of the board recommended removal of the liquid waste and a clay covering. The Board, in response to the community's concerns, passed

Resolution 80-142 recommending Alternative 6, total removal, to the State Water Resources Control Board. At that meeting, six million dollars was quoted as the cost estimate for total removal.

July 15, 1980

CNA held a public meeting and the event was well attended. Lois Gibbs, Tom Hayden and Penny Newman, President of CNA, spoke at the meeting. The meeting was attended by people from the community, an aide to Congressman George Brown, and several members of the press.

August 16, 1980

State Senator Robert Presley, who had been instrumental in appropriating special State funds for Stringfellow cleanup, held a public meeting on August 16, 1980. The EPA Region IX hazardous waste contact person, representatives from the State Board and Department of Health, and Regional and county officials presented the facts of the Stringfellow site as they understood them and answered questions from area residents.

October 1981

The State Legislature passed the State Superfund. The community was very involved with the passage of the State Superfund Law.

November 5, 1981

The County Press Enterprise published an article on a "Giant Underground Leak in the Stringfellow Acid Pits."

April 9, 1982

The RWQCB went on record in recommending a remedy for interim abatement, containment and leachate control that would cost approximately four million dollars. The ultimate decision concerning site mitigation was transferred to the DOHS.

June 1982

DOHS developed the Community Relation Plan.

June 15, 1982

DOHS met with the community groups and briefed them on DOHS activities concerning the site, including their selection of the onsite containment remedy.

April 1983

DOHS met with the State and local officials, community groups and the press, to discuss recent sampling data.

April 22, 1983

Congressional Committee on Science and Technology held a hearing in Glen Avon. The Director of the Office of Emergency and Remedial Response discussed the proposed cooperative agreement and proposed scope of work for the site.

May 1983

Penny Newman of CNA requested that $25,000 be included in the Community Relations Plan for a technical consultant to review work done onsite.

June 15, 1983

Final cooperative agreement application from State received in Headquarters, including funding request for community's technical consultant.